

Claims

1. A refrigerant compressor capacity control valve comprising suction, discharge and crankcase ports, and a plunger positionable within a central axial bore of said control valve for controlling refrigerant flow from said discharge port to said crankcase port to achieve compressor capacity control, wherein:
 - 5 said central axial bore terminates in a suction chamber coupled to said suction port, said suction chamber housing a pneumatically-operated control element secured to a first end of said plunger for producing a first axial bias on said plunger in relation to refrigerant pressure in said suction chamber;
 - 10 an electrically-operated control element secured to a second end of said plunger for producing a second axial bias on said plunger in relation to an electrical activation level thereof;
 - 15 a lateral plunger bore open to refrigerant pressure at said discharge port, and an axial plunger bore extending from said lateral plunger bore through the second end of said plunger;
 - 20 a housing element defining a stop for the second end of said plunger and having an aperture axially aligned with said axial plunger bore so that refrigerant discharge pressure is continuously coupled to said aperture through said lateral plunger bore and said axial plunger bore; and
2. The capacity control valve of Claim 1, wherein said pneumatic control element is a bellows having a first end secured to the first end of said plunger and an internal spring that produces a spring bias on said plunger, the capacity control valve further comprising:
 - 5 an adjustment mechanism disposed in an end of said control valve and engaging a second end of said bellows, said adjustment mechanism being axially movable to adjust the spring bias of said internal spring.

3. The capacity control valve of Claim 1, wherein discharge refrigerant pressure in said lateral plunger bore exerts a third axial bias on said plunger that aids said first axial bias produced by said pneumatically-operated control element.

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4. The capacity control valve of Claim 1, wherein said electrically-operated control element includes a permanent magnet pole piece disposed about said plunger, and a moving coil armature affixed to said plunger such that electrical activation of said moving coil armature produces said second axial bias by virtue of an attractive force between said moving coil armature and said permanent magnet pole piece.

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5. The capacity control valve of Claim 1, wherein said suction, discharge and crankcase ports are arranged in order, with said suction port being disposed inboard of said discharge and crankcase ports.